Topic: Position function

Question: Find velocity given the position function.

$$x(t) = 4t^2 - 6t + 2$$

Answer choices:

A $v(t) = 8t - 4$

B $v(t) = 8t + 6$

C $v(t) = 4t - 6$

D $v(t) = 8t - 6$

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Solution: D

Velocity is the derivative of position, so

$$v(t) = x'(t)$$

Therefore, to find the velocity function associated with this position function, we'll just take its derivative.

$$x(t) = 4t^2 - 6t + 2$$

$$v(t) = x'(t) = 8t - 6$$

The velocity function associated with this position function is $v(t) = 8t - 6$.

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Topic: Position function

Question: Find the position of a car when its velocity is zero, given its position function.

$$x(t) = 4t^2 - 8t + 10$$

Answer choices:

A $x = 6$

B $x = 7$

C $x = 10$

D $x = 0$

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Solution: A

Velocity is the derivative of position, so

$$v(t) = x'(t)$$

Therefore, to find the velocity function associated with this position function, we'll just take its derivative.

$$x(t) = 4t^2 - 8t + 10$$

$$v(t) = x'(t) = 8t - 8$$

We need to find position when velocity is equal to 0, so we'll get

$$8t - 8 = 0$$

$$8t = 8$$

$$t = 1$$

Now we know that velocity is 0 when $t = 1$. To find position at the same time, we'll just plug $t = 1$ into the position function.

$$x(1) = 4(1)^2 - 8(1) + 10$$

$$x(1) = 6$$

The position of the car when velocity is 0 is $x = 6$.

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Topic: Position function

Question: Use the position function to find the velocity of a rocket.

$$x(t) = 6t^3 - t^2 + 3t - 9$$

when $t = 4$

Answer choices:

A $v = 238$

B $v = 371$

C $v = 283$

D $v = 317$

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Solution: C

Velocity is the derivative of position, so

$$v(t) = x'(t)$$

Therefore, to find the velocity function associated with this position function, we'll just take its derivative.

$$x(t) = 6t^3 - t^2 + 3t - 9$$

$$v(t) = x'(t) = 18t^2 - 2t + 3$$

We need to find velocity when $t = 4$, so we'll plug $t = 4$ into the velocity function we just found.

$$v(4) = 18(4)^2 - 2(4) + 3$$

$$v(4) = 283$$

The velocity of the rocket at $t = 4$ is $v = 283$.

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